16. On the Madagascar Frogs of the Genus *Mantidactylus* Blgr. By G. A. Boulenger, F.R.S., F.Z.S.

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Among the many peculiar features of the herpetological fauna of Madagascar is the fact of the genus *Rana*, so numerous in species in Continental Africa and the Indo-Malayan Region, having only two representatives : *R.* (*Tomopterna*) *labrosa* Cope, allied to the South African *R. natalensis* A. Smith, and *R.* (*Ptychadena*) *mascareniensis* D. & B., distributed over the greater part of Africa, the Seychelles and the Mascarenes included.

Most of the Madagascar frogs originally referred to *Rana* or *Limnodytes* (*Hylorana*) have proved to be distinguished by the presence of an intercalated bone between the penultimate and distal phalanges of the fingers and toes and have been referred to an autochtonous genus, *Mantidactylus* *. In the species grouped by me under this genus, the swellings or discs in which the fingers and toes terminate bear on the lower surface a ring-shaped groove, defining a circular or transversely elliptic area, thus affording a further distinctive character by which to recognise them among those species of *Rana* in which digital discs are likewise present.

One species, *Limnodytes madagascariensis* A. Dum. (*R. inguinalis* Gthr.), which I had left in the genus *Rana*, has been shown by the late Dr. F. Mocquard to be also provided with the intercalary phalanx and therefore referred by him to *Mantidactylus* ; but as in this species the small digital terminal expansions are devoid of the groove to which I now draw attention, I consider it to be entitled to generic distinction, under the new name of *Aglyptodactylus*. In this *A. madagascariensis*, the omosternum is forked at the base, as in *Mantidactylus*, the nasal bones are small, oblique, and separated from each other as well as from the frontoparietals, and the terminal phalanges are obtuse ; there are no femoral glands.

We are now acquainted with 22 species of *Mantidactylus*, to which a twenty-third is here added. A key to the identification

* Ann. & Mag. N. H. (6) xv. 1895, p. 450.

of the species was drawn up by Mocquard in 1909 *, but as this key does not seem to me to work well and as the arrangement therein followed does not at all express the natural affinities, I have prepared a synopsis in which I have endeavoured to make good these deficiencies, so far as it is possible to do so in a linear sequence.

Synopsis of the Species of Mantidactylus.

I. Glandular dorso-lateral fold, if present, not confluent with the supratemporal fold.

A. Discs of fingers very small, usually smaller than those of the toes; snout rounded or very obtusely pointed, not or but feebly projecting beyond the mouth; loreal region oblique; belly perfectly smooth, or very feebly granulate behind.

1. Toes entirely or nearly entirely webbed; head broader than long; back granulate.

Tympanum hidden or small, very indistinct, and distant from the eye; tibio-tarsal articulation not reaching beyond the eye; heels meeting or not, when the limb is folded at right angles to the body; tibia $2\frac{1}{3}$ to 3 times as long as broad, $2\frac{1}{3}$ to $2\frac{2}{5}$ times in length from snout to vent..... *M. guttulatus* Blgr. 1881 †.

Tympanum distinct, small and distant from the eye; tibio-tarsal articulation reaching eye or tip of snout ..... *M. grandidieri* Mocquard, 1895.

Tympanum distinct, $\frac{3}{4}$ diameter of eye; tibio-tarsal articulation reaching posterior border of eye..... *M. inaudax* Peracca, 1893.

2. Toes $\frac{1}{2}$ to $\frac{2}{3}$ webbed; head as long as broad; tympanum very distinct, $\frac{2}{3}$ to $\frac{3}{4}$ diameter of eye.

Series of vomerine teeth nearly equidistant from each other and from the choanæ; tibio-tarsal articulation reaching eye; heels meeting; tibia $2\frac{2}{3}$ to 3 times as long as broad, $2\frac{1}{4}$ to $2\frac{1}{3}$ times in length from snout to vent; back smooth..... *M. alutus* Peracca, 1893.

Series of vomerine teeth much nearer the choanæ than each other; tibio-tarsal articulation reaching tip of snout, or between eye and tip of snout; heels strongly overlapping; tibia $3\frac{1}{2}$ to 4 times as long as broad, $1\frac{3}{4}$ to 2 times in length from snout to vent; back with glandular longitudinal folds..... *M. betsileanus* Blgr. 1882 ‡.

B. Discs of fingers small, as large as or larger than those of the toes; belly smooth or granulate only on the sides and behind.

1. Head as long as broad or a little broader than long; snout rounded or obtusely pointed; toes at least $\frac{1}{4}$ webbed.

a. Tibio-tarsal articulation reaching tympanum or posterior border of eye; heels not overlapping; tibia $2\frac{1}{2}$ to 3 times as long as broad, 2 to $2\frac{2}{5}$ times in length from snout to vent; first and second fingers equal; loreal region oblique; back smooth or with indistinct flat warts; belly smooth.

Tympanum $\frac{1}{2}$ to $\frac{3}{4}$ diameter of eye; toes $\frac{3}{4}$ webbed. *M. curtus* Blgr. 1882.

Tympanum $\frac{2}{3}$ to $\frac{3}{4}$ diameter of eye; toes $\frac{1}{3}$ to $\frac{1}{2}$ webbed..... *M. biporus* Blgr. 1889.

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* N. Arch. Mus. (5) i. p. 55.

† Includes *M. piger* Mocquard, 1900.

‡ Includes *M. multiplicatus* Boettg. 1913.

b. Tibio-tarsal articulation reaching eye or between eye and nostril; toes $\frac{2}{3}$ to $\frac{3}{4}$ webbed; tympanum $\frac{3}{5}$ to once diameter of eye.

Loreal region oblique; tympanum not more than $1\frac{1}{2}$ times its distance from the eye; tibia $2\frac{1}{2}$ to 3 times as long as broad; inner metatarsal tubercle $\frac{1}{4}$ to $\frac{1}{3}$ length of inner toe; back with or without small elongate warts; belly perfectly smooth ..... *M. ambohimitombi*, sp. n.

Loreal region oblique; tympanum 2 to 3 times its distance from the eye; tibia 3 to $3\frac{1}{2}$ times as long as broad; inner metatarsal tubercle $\frac{1}{4}$ to $\frac{1}{3}$ length of inner toe; back with elongate warts or glandular folds; belly granulate on the sides and behind ..... *M. ulcerosus* Boettg. 1880.

Loreal region nearly vertical; inner metatarsal tubercle $\frac{1}{2}$ length of inner toe; two glandular folds along the back ..... *M. bellyi* Mocquard, 1895.

c. Tibio-tarsal articulation reaching beyond tip of snout; toes $\frac{1}{2}$ webbed; tympanum a little smaller than the eye; three glandular folds along the back; belly smooth ..... *M. opiparis* Peracca, 1893.

3. Head a little longer than broad; snout pointed, strongly projecting beyond the mouth; tibio-tarsal articulation reaching anterior border of eye or nostril; toes not more than $\frac{1}{4}$ webbed; belly smooth.

Tympanum larger than the eye; first finger shorter than second; two glandular folds along the back ..... *M. ærumnalis* Peracca, 1893.

Tympanum about $\frac{1}{2}$ diameter of eye; first finger as long as or slightly shorter than second; back with large glands ..... *M. glandulosus* Meth. & [Hew. 1913.

C. Discs of fingers rather large, at least nearly twice as broad as the penultimate joint, as large as or larger than those of the toes.

1. Belly perfectly smooth; tibio-tarsal articulation reaching eye; heels meeting; tibia 3 times as long as broad, 2 to $2\frac{1}{4}$ times in length from snout to vent; toes entirely or nearly entirely webbed; first finger much shorter than second; loreal region nearly vertical.

Head longer than broad; snout pointed, strongly projecting beyond the mouth; tympanum $\frac{3}{4}$ diameter of eye ..... *M. majori* Blgr. 1896.

Head as long as broad; snout rounded or obtusely pointed, moderately projecting; tympanum $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye ..... *M. cowanii* Blgr. 1882.

2. Belly granulate behind and on the sides only; heels overlapping; tibia $3\frac{1}{2}$ to 4 times as long as broad; toes $\frac{3}{4}$ to nearly entirely webbed; inner metatarsal tubercle $\frac{1}{4}$ to $\frac{1}{3}$ length of inner toe; first finger a little shorter than second; tympanum $\frac{2}{3}$ to $\frac{4}{5}$ diameter of eye; loreal region nearly vertical.

Tibio-tarsal articulation reaching eye, nostril, or tip of snout; tibia $1\frac{3}{4}$ to 2 times in length from snout to vent; tongue usually with a conical papilla in the middle of the anterior third ..... *M. lugubris* A. Dum. 1853*.

Tibio-tarsal articulation reaching tip of snout or beyond; tibia $1\frac{2}{3}$ times in length from snout to vent ..... *M. flavicrus* Blgr. 1889.

3. Belly granulate; heels strongly overlapping.

a. Tibio-tarsal articulation reaching eye or tip of snout; tibia $3\frac{1}{2}$ to $4\frac{1}{2}$ times as long as broad, $1\frac{3}{4}$ to 2 times in length from snout to vent; tympanum $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye; loreal region nearly vertical.

Toes $\frac{2}{3}$ webbed; inner metatarsal tubercle small, feebly prominent, $\frac{1}{4}$ length of inner toe; a narrow dorso-lateral glandular fold ..... *M. granulatus* Boettg. 1884.

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* Includes *M. femoralis* Blgr., 1882, and *ambreensis* Mocquard, 1895.

Toes ½ webbed; inner metatarsal tubercle strong and prominent, compressed, ½ to ⅔ length of inner toe; no dorso-lateral fold ..... *M. redimitus* Blgr. 1889.

b. Tibio-tarsal articulation reaching beyond tip of snout; tibia 4½ to 5 times as long as broad, 1½ to 1⅔ times in length from snout to vent; loreal region oblique.

Toes nearly entirely webbed; inner metatarsal tubercle ⅓ length of inner toe; tympanum ½ to ⅔ diameter of eye; a pair of inwardly curved glandular folds on the anterior third of the back, from the upper eyelids; heel with a dermal process or spur ..... *M. luteus* Meth. & Hew. 1913.

Toes ½ to ⅔ webbed; inner metatarsal tubercle ½ to ⅗ length of inner toe; tympanum ½ to ⅔ diameter of eye; a curved glandular fold on each side from the upper eyelid to between the shoulders, followed by a straight fold ..... *M. pliciferus* Blgr. 1882.

Toes ½ webbed; inner metatarsal tubercle ⅔ to ¾ length of inner toe; tympanum ⅔ to ¾ diameter of eye; upper parts rough with prominent glandular folds and tubercles; heel with a dermal process or spur ..... *M. asper* Blgr. 1882.

II. Glandular dorso-lateral fold extending from behind the eye to the hip; loreal region vertical; tympanum ⅔ to once diameter of eye; discs of fingers and toes rather large; tibio-tarsal articulation reaching tip of snout or a little beyond; tibia 4½ to 5 times as long as broad, 1⅔ to 1¾ times in length from snout to vent; toes ½ webbed; belly granulate behind. *M. albofrenatus* F. Müll. 1892*.

Nothing is known of the development and larvæ of these frogs, but the eggs are remarkably large, measuring 5 mm. in diameter in *M. guttulatus* (♀ 120 mm. from snout to vent), 3 mm. in *M. lugubris* (♀ 50 mm.), 2·5 mm. in *M. betsileanus* (♀ 33 mm.).

Mantidactylus ambohimitombi, sp. n.

Vomerine teeth in short transverse or oblique series behind the level of the choanæ, equidistant from the latter and from each other. Head a little broader than long; snout rounded, feebly projecting beyond the mouth, with indistinct canthus and very oblique, concave loreal region; nostril equidistant from the eye and from the end of the snout; interorbital region as broad as or a little narrower than the upper eyelid; tympanum distinct, ⅔ to ¾ the diameter of the eye, 1 to 1½ times its distance from the latter. Fingers moderately long, first and second equal or first a little the longer, the discs small, not very much larger than the well-developed subarticular tubercles. Toes moderately long, ¾ webbed, the discs about as large as those of the fingers; no tarsal fold; inner metatarsal tubercle oval, moderately prominent, ¼ to ⅓ the length of the inner toe; no outer tubercle. Tibio-tarsal articulation reaching the eye or between the eye and the nostril; tibia 2½ to 3 times as long as broad, 1⅘ to 2 times in

* *M. frenatus* Boettg., 1913, is probably identical with this species, although the hind limb is longer and the discs of the fingers and toes are described as very small.

length from snout to vent, as long as or a little shorter than the foot. Skin finely granulate above, with or without elongate flat warts on the sides of the body; a strong, curved glandular fold from the eye to the shoulder; lower parts smooth; femoral gland more or less distinct, with a single pit, or absent. Brown above, spotted or marbled with darker, often with a large dark triangular spot between the eyes; a dark canthal streak and a temporal band, usually light-edged beneath; a yellow vertebral streak sometimes present; limbs with more or less distinct dark cross-bands; hinder side of thighs usually dark brown, with small yellow spots. White beneath, uniform or mottled with brown, or nearly entirely brown. Male without vocal sacs.

Nasal bones rather large, narrowly separated from each other and from the frontoparietals.

From snout to vent 65 millim.

Several specimens from the Ambohimitombo Forest, Madagascar, from the collection of Dr. Forsyth Major, 1896.